

**New claims**

1. Material based on SiAlONs with a component A consisting of alpha- and beta-SiAlON and an amorphous or partially crystalline grain-boundary phase and a component B, a hard material,  
5 characterised by a composition of 70 to 97 vol.% of component A and 3 to 30 vol.% of component B, wherein in a sintered compact the material has an alpha-SiAlON gradient which falls from the outside in and the alpha-SiAlON content of the as-fired surface can be up to 100%.
2. Material according to claim 1, characterised in that  
15 SiC, Ti(C,N), TiC, TiN, carbides and/or nitrides of elements from groups IVb, Vb and VIb of the periodic table, as well as scandium carbide and/or scandium oxycarbide or mixtures of the cited hard materials, are used as hard materials, component B, whose state remains unchanged after sintering.
3. Material according to claim 1 or 2, characterised in  
20 that the content of grain-boundary phase is less than 10 vol.%, preferably less than 5 vol.%, and that the grain-boundary phase is amorphous.
4. Material according to claim 1 or 2, characterised in  
25 that the content of grain-boundary phase is less than 10 vol.%, preferably less than 5 vol.%, and that the grain-boundary phase is partially crystalline.
5. Material according to one of claims 1 to 4,  
30 characterised in that the grain-boundary phases contain crystalline phases, preferably aluminium-containing melilite or disilicate.
6. Material according to one of claims 1 to 5,  
characterised in that the maximum size of the alpha- and beta-SiAlON grains is less than 90 µm,

preferably less than 65 µm, particularly preferably less than 50 µm.

7. Material according to one of claims 1 to 6, characterised in that the average grain size of the hard materials is less than 30 µm, preferably less than 15 µm, particularly preferably less than 5 µm.
- 5 8. Material according to claim 7, characterised in that the hard material grains are globular, whisker-shaped or platelet-shaped.
- 10 9. Material according to one of claims 1 to 8, characterised in that its hardness is > 1550 HV 10.
10. Material according to one of claims 1 to 9, characterised in that it is coated with wear-reducing coatings such as Al<sub>2</sub>O<sub>3</sub>, TiN or TiC.
- 15 11. Process for producing a material based on SiAlONs according to one of claims 1 to 10 by powder mixing, shaping, sintering and grinding, as is used in the production of high-performance ceramic components, particularly those made from SiAlON materials.
- 20 12. Process according to claim 11, characterised in that component A is formed during a heat treatment at temperatures of 1800 to 2000°C and retention times at the maximum temperature of 0.5 to 5 hours.
- 25 13. Process according to claim 11 or 12, characterised in that the gas atmosphere during sintering is inert and contains N<sub>2</sub> or a mixture of N<sub>2</sub> and other inert gases, particularly argon.
- 30 14. Material according to one of claims 1 to 10, produced by a process according to claims 11 to 13, for use as a cutting material.
15. Material according to one of claims 1 to 10, produced by a process according to claims 11 to 13,

for use as a cutting material for machining grey cast iron.

16. Material according to one of claims 1 to 10,  
produced by a process according to claims 11 to 13,  
5 for use as a sealing ring.
17. Material according to one of claims 1 to 10,  
produced by a process according to claims 11 to 13,  
for use in fuel and coolant pumps, compressors,  
turbochargers, heat exchangers and air conditioning  
10 systems.